ELSEVIER International Journal of Approximate Reasoning 27 (2001) 95–97

INTERNATIONAL JOURNAL OF APPROXIMATE REASONING

www.elsevier.com/locate/ijar

Introduction

Special Issue on causal networks: papers from the Second CaNew Workshop

Ramón Sangüesa *, Ulises Cortés

Department Llenguatges i Sistemes Informátics, Technical University of Catalonia, Campus Nord, Mòdul C6, Despatx 204, c/Jordi Girona Salgado, 1-3 08034 Barcelona, Spain

Received 1 September 2000; accepted 1 March 2001

1. Preamble

For the second consecutive occasion, the International Journal of Approximate Reasoning acts as a host to the workshop "Causal Networks, from Inference to Data Mining" (CaNew'2000). In this issue we are proud to present selected papers from the CaNew'2000 workshop [5] which took place under the organizational umbrella of the ECCAI'2000 conference, held in Berlin. This was the second workshop in a series started in 1998 in Lisbon during the IBERAMIA'98 [4] conference. Over 30 contributions coming from eight different countries were received after the call for papers. Each paper was submitted to two different referees which kept high the necessary quality standards for the meeting. Eleven papers finally passed through and were presented and discussed at the meeting that took place in Berlin during the 14th European Conference on Artificial Intelligence. Attendance of the workshop was around 25 people which contributed to discussion of the presentations.

The Editor-in-Chief of this journal offered the opportunity to make a further selection of the papers and publish them in the *International Journal of Approximate Reasoning*. This is the origin of this Special Issue on causal networks. Workshop authors were invited to substantially extend their papers and submit their modified contributions to the referees of the journal, which

* Corresponding author. Tel.: +34-93-4015640; fax: +34-93-4017041.
E-mail address: sanguesa@lsi.upc.es (R. Sangüesa).

PII: S0888-613X(01)00035-4

followed this journal review procedures. This resulted in a subset of the originally presented papers, greatly enhanced by the journal referees' constructive comments, criticisms and suggestions.

The papers of this edition of the workshop showed a shift in focus with respect to the first one, that parallels developments in the area of Bayesian and causal networks. If a common theme could be found in this edition contributions, it would be the shift of interest towards applications. In effect, most of the papers are devoted to solve or formalize some practical needs in the area: diagnosis, feature selection or working wih scarce data.

We briefly present and comment on the accepted papers in the following.

2. The selected papers

In *Bayesian model-based diagnosis*, Lucas explores the relationship between different representational mechanisms for diagnosis tasks and creates an interesting bridge between logical and Bayesian representations. It focuses on the use of uncertainty in model-based diagnosis and shows good properties of Bayesian networks for its management. The resulting proposed method integrates logical reasoning with probabilistic reasoning, and reasoning about structure and behaviour of systems by taking probabilistic independence into account. This shows a way for applying Bayesian networks in such a much-demanded task as diagnosis is.

Accelerating chromosome evaluation for partial abductive inference in Bayesian networks by means of explanation set absorption by de Campos, Gámez and Moral tries to devise a method for improving the task of finding the most probable configuration of a subset of variables in a network reponsible for an observed variable value assignment. This also has some relationship to the needs of diagnosis under certain circumstances. In effect, diagnosis can be cast as a type of partial abductive inference. The proposed system may result in an improvement of the actual cumbersome abductive methods for Bayesian networks. The substantial experimental speedup shows a lot of promise for this type of methods.

Feature subset selection by Bayesian networks: a comparison with genetic and sequential algorithms by Inza, Larrañaga and Sierra tries to analyze the benefits of using Bayesian networks in estimation distribution algorithms (EDAs, [3]) for a very well known and useful task present in most data mining efforts such as feature subset selection. The results of estimation Bayesian network algorithm (EBNA) [2] open interesting applicability issues. For example, it is shown that the present method optimizes the predictive accuracy of the naive Bayes supervised classifiers.

Learning Bayesian network parameters from small data sets: application of Noisy-OR gates by Oniśko, Druzdzel and Wasyluk addresses the very real

problem of extracting quality networks from insufficient data. The authors argue and show that using noisy-OR gates may reduce the need for extensive number of cases and configurations in the data in order to obtain a *good* enough network. Results are shown and discussed for a medical diagnosis domain.

Estimating values from and incomplete data set by Acid, de Campos and Huete, which is an important re-elaboration of the original paper uses probability intervals [1] to overcome the problems of learning Bayesian networks from incomplete data. Probability intervals are used to obtain bounds for the expected number of dataset entries and are iteratively refined until convergence is attained.

3. Conclusion

The selected papers represent state-of-the-art contributions to current problems in the area. During the discussions that were held during the CaNew'2000 workshop, new contributions by authors showed that the area of causal networks and its applications have a great deal of potential and offer an interesting perspective for research. We thank both the organizers of ECAI'2000 and the Editor-In-Chief of the International Journal of Approximate Reasoning (who proactively participated in the workshop) for providing such good frameworks for discussion and wider diffusion of ideas. The referees both for the workshop and for this issue did a great work and we all learnt from their remarks and suggestion. We look forward to the next CaNew workshop which surely will continue this line of quality.

References

[1] L.M. de Campos, J.F. Huete, S. Moral, Uncertainty management using probability intervals, in: B. Bouchon-Meunier, R.R. Yager, L.A. Zadeh (Eds.), Advances in Intelligent Computing–IPMU'94, Springer, Berlin, 1994, p. 190–199.

[2] I. Inza, P. Larrañaga, R. Etxeberria, B. Sierra, Feature subset selection by Bayesian networks based optimization, Artif. Intell. 123 (2000) 157–184.

[3] P. Larrañaga, J.A. Lozano (Eds.), Estimation Distribution Algorithms: A New Tool for Evolutionary Computation, Kluwer Academic Publishers, Dordrecht, 2001.

[4] R. Sangüesa, U. Cortés (Eds.), Proceedings of the First International Workshop on Bayesian and Causal Networks, CaNew'98, Lisbon, Portugal, 1998. Sixth Iberoamerican Conference on Artificial Intelligence, IBERAMIA'98.

[5] R. Sangüesa, U. Cortés (Eds.), Proceedings of the Second International Workshop on Bayesian and Causal Networks: CaNew2000, ECCAI, 2000.